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TWO NEW RACES OF *CARPODACUS MEXICANUS*.¹

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During the course of work on a Review of the Subgenus *Burrica*, a comparison of nearly fifteen hundred specimens, assembled through the courtesy of the curators of the major museums of the United States and the British Museum, has convinced the author that Ridgway's dictum (Birds of North and Middle America, Part I, p. 138 footnote) that "variation in the extent of the red is not geographical" in *Carpodacus mexicanus frontalis*, is no longer tenable. It is obvious Ridgway did not suspect the relatively tremendous effect of wear on both the extent and coloration of male House Finches, a process which has been fully understood only in recent years. (See Grinnell, 1911, Univ. Cal. Pub. Zool., Vol. 7, No. 4, pp. 179-195; H. M. and J. R. Michener, Condor, 1931, Vol. XXXIII, pp. 12-19; Moore, 1936, Condor, Vol. XXXVIII, pp. 203-208.) One of the proofs of this is Ridgway's description under *Carpodacus mexicanus roseipectus* (op. cit. p. 133) of two males from Huajuapam, Oaxaca, as "darker" than *C. m. mexicanus*, when they are in fact merely early (Nov. 18th) winter plumage males of true *mexicanus*, which, like all House Finches, are always "darker" in November plumage. Instead of segregating his birds according to "extent of red," he should have segregated them according to stage of wear, into at least four separate groups in each area and compared only similar groups.

Analysis of a much larger series, based upon a more exact knowledge of the processes of molt (See the Micheners, op. cit.), indicates that *Fringilla frontalis* Say is a composite of four races, (1) the bird of north-central Colorado, north of the Arkansas River and east of the Divide, which J. D. Figgins

¹Contributions from the California Institute of Technology.

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described as *Carpodacus frontalis smithi*; (2) true *frontalis*, restricted to the birds of Colorado, south of the Arkansas River and west of the Divide, to Kansas, Oklahoma, New Mexico and extreme eastern Arizona; (3) an unrecognized paler race of the Great Basin and (4) a darker, more extensively red race on the west coast. These last two are described herewith.

A complete understanding of the affinities of these two proposed races and their relation to other forms of *Burricea* can be obtained only by a study of all the races of northern Mexico, as well as of the islands off the Pacific Coast. This, the author has undertaken in his Review of *Burricea*, which is now in the hands of the publisher. It would take too long to repeat the evidence given therein, by which the author concludes that *frontalis* shows closest affinity with *smithi* to the north and with the races of the Mexican Plateau, associated in a closely related company, which he has termed the Plateau Group. In a similar way the undescribed Great Basin race reveals affinities with *ruberrimus* and *rhodopus* of the coastal plains about the Gulf of Lower California, which he has termed the Western Desert Group, while the California form belongs with the darker races of the islands off the Pacific coast, *clementis*, *mcgregori* and *amplus* in the Marine Group.

I conclude this introduction briefly by saying that *sayi* J. D. Figgins (Figgins, Proc. Col. Mus. Nat. Hist., Vol. IX, No. I, April 22, 1930, p. 3) is a synonym of *Fringilla frontalis* Say; that *Pyrrhula inornata* Vigors is revealed by an examination of the Latin description not to be a House Finch, but probably one of the Purple Finches. These two names, as well as others, are discussed fully in the above-mentioned Review of *Burricea*.

In order to save space, and at the same time to show clearly the localities, from which the vast number of specimens have been examined, I am listing them in a briefer way, but still giving the essential facts. I protest the present tendency of describers to omit the exceedingly important data on which their findings are based. Without knowledge of the localities from which specimens were examined, a later investigator in the same field finds himself confronted with a mere "opinion" and has no way of ascertaining whether that "opinion" was based on sufficient and comprehensive factual data, or not.

Where reference is made to the "five inch rainfall area,"

it indicates the mean annual rainfall from zero to five inches, whereas "ten inch" designates the rainfall from five to ten inches. The word "red" is a general term indicating various shades and tints of that color.

***Carpodacus mexicanus solitudinis*, subsp. nov.**

DESERT HOUSE FINCH.

Type.—Male adult, No. 22858, collection of Robert T. Moore; Fallon, Nevada; April 3, 1939, collected by Ray Alcorn and Robert T. Moore.

Subspecific characters.—Nearest in its affinities to *C. m. ruberrimus* of Sonora, but red less extensive, ground color slightly whiter and size larger.

Resembling *C. m. frontalis* in size, it differs in the winter plumage, having the upper parts more Drab² (less gray) above, with even less suffusion of red, if any, the red being confined to the rump, forehead and superciliary streak even in the winter plumage; the crown and occiput being Brownish Drab streaked with darker, paler above in nuptial plumage; ground color of posterior under parts whiter, often pure white; streaking finer; red of anterior under parts less extensive; in worn nuptial plumage ground color of under parts much whiter than in corresponding plumage of *frontalis*, generally pure white; streaking finer and suffusion of red on upper parts, except forehead and rump, obsolete or rarely present.

Range.—*Solitudinis* expresses itself most clearly in the extreme arid desert conditions of Nevada, where the mean annual rainfall is less than five inches, but it extends into areas where the rainfall is from five to ten inches in Nevada, the extreme arid portions of Mono and northern Inyo Counties, California, southeastern Oregon, southern Idaho, southeastern Washington from Wallula to Walla Walla, possibly to Yakima Valley of Washington and the Okanagan Valley of Washington and British Columbia.

I do not know what form the House Finches of the Okanagan Valley in northeastern Washington and the region about Penticton, British Columbia represent. Mr. S. J. Darcus informs me they breed at Penticton, but no specimens have been taken. They occupy a tongue of the Arid Temperate Zone, having a mean annual rainfall of ten inches or less. Thanks to the courtesy of Miss Flauhaut, the fine series from Kiona, Gibbon and Wenatchee, southeastern Washington, have been examined. All are winter plumage birds, except two. Not very close to *solitudinis*, they have its pale ground color, but are more suffused with red above, more extensively red below and buffy on the sides. They may be intergrades with the unknown birds of Victoria, B. C. Birds of Death Valley, California, are slightly more extensively red below, but have just as pure a white ground color and are closer to *solitudinis*.

Specimens examined.—*Solitudinis*: 5 ♂ 2 ♀ from S. E. WASHINGTON; Wallula, Walla Walla. 11 ♂ 7 ♀ from E. OREGON: Millers, Moro, John Day River, Hart Mt., Adel, Plush, Steen Mts., Beulah, Vale, Ontario, Hermiston.

²Names of colors in this paper, when capitalized, are taken from Ridgway's "Color Standards and Color Nomenclature," 1912.

3 ♂ 1 ♀ from S. IDAHO: Riddle, Payette, Pocatello. 31 ♂ 14 ♀ from NEVADA: Fallon (Type), Pyramid Lake, Truckee River, near Wadsworth, Virginia Mts., Virgin Valley, Quinn River, near Pine Forest Mts., Carson City, Yerington, Kingston Creek, Millet, Crystal Springs, Indian Springs, Charleston Mts., St. Thomas. 8 ♂ 1 ♀ from CALIFORNIA: Mono Lake, Keeler, Shoshone, Triangle Spring, Furnace Creek Ranch. Unknown intergrades: 17 ♂ 15 ♀ from WASHINGTON: Zillah, Wenas Valley, Yakima, Gibbon, Kiona, Wawawai, Wenatchee. Intergrades with birds of CALIFORNIA: 1 ♂ from S. OREGON: Klamath Falls. 24 ♂ 6 ♀ from CALIFORNIA: Tule Lake, Warner Mts., Goose Lake, Alturas, Sugar Hill, Vinton, Cannell Meadow, Whitney Meadow, Planada, Sweeney's Ranch, Isabella, Waltham Cr., Ft. Tejon, near Palmdale, San Jacinto Mts., Lower Palm Canyon, Cabazon, Banning, San Gorgonio Pass, S. Palo Verde, Foot of Coast Range Col. Desert. Intergrades with *C. m. frontalis*: 5 ♂ 4 ♀ from UTAH: Salt Lake City, Great Salt Lake, Provo, Iron City, Washington, Antelope Is.; 2 ♂ from N. W. ARIZONA: Grand Canyon, above Big Williams River. Intergrades with *ruberrimus*: 13 ♂ 5 ♀ from S. E. CALIFORNIA: Potholes, Laguna, Bard, Kane Spring, Mellon; 1 ♂ from S. W. ARIZONA: below Cibola; 9 ♂ from SONORA: El Doctor, Saric; 7 ♂ 2 ♀ from N. E. LOWER CALIFORNIA: Cerro Prieto, Las Palmas Canyon, El Cajon Canyon.

Remarks.—If my concept of this race is correct, its paleness above and white coloration below are due to the excessive aridity and other meteorological factors of the Great Basin, which reach their extreme manifestation in the very portions of Nevada and eastern California, where *solitudinis* is found in its best expression. The low humidity, large number of days with continuous sunshine, purity of the air, rapid evaporation and great diurnal variation may all have exercised an influence. From the five-inch rainfall area of western Nevada arms of the ten-inch area extend into the surrounding States. By means of this area, as well as parts of the fifteen-inch area, *solitudinis* inosculates with other races northwest, south and east of it. For example, specimens from localities in the lower San Joaquin Valley, where the mean annual rainfall (U. S. Dept. Agr. Weather Bureau 1930, Climatic Summary, Sec. 19) ranges from 5.37 to 8.21 inches, have the posterior under parts much whiter than birds of the same nuptial plumage from northwestern California, where it ranges from 24.69 to 109.45 inches at the various meteorological stations. This ten-inch area is separated from the ten- and five-inch areas of eastern California and Nevada by a narrow strip of the fifteen southeast of Bakersfield. The Cannell Meadow and Whitney Meadow males are probably summer wanderers to higher altitudes from this region, having the posterior under parts white. Similar groups of white-bellied individuals are found on all sides of *solitudinis*, for example in northeastern Oregon, Yakima Valley of southern Washington, southeastern Idaho, northeastern California (Modoc County), Imperial Valley and northwestern Arizona, all of them in five- or ten-inch rainfall areas, except the Modoc County birds. The three stations there, which surround our bird-localities, range from 10.6 to 12.43 inches. The presence of breeding birds at Pentiction, British Columbia, was discovered by Mr. S. J. Darcus and corroborated later by Major Allan Brooks, who

writes he has "seen the birds and their nest in the orchards." Apparently House Finches are pushing gradually northward, for this occurrence, like the one in Victoria, B. C., represents a recent extension of range.

On the other hand, the restricted amount of red, found to the same degree in no other race, except *C. mexicanus mexicanus* of extreme southern Mexico, is probably due to a totally different set of factors, possibly heritable. As we proceed south from Nevada into California and Arizona we find this red becoming more extensive, so that even the birds of the five-inch rainfall area in Death Valley, although maintaining the other characters of *solitudinis*, including pure white ground color, are more expansively red.

***Carpodacus mexicanus grinnelli*,³ subsp. nov.**

GRINNELL'S HOUSE FINCH.

Type.—Male adult, no. 19226, col. Mus. Ver. Zool., Univ. Calif.; Scott River, 6 mi. N. W. of Callahan, Siskiyou Co., Calif.; June 11, 1911, collected by A. M. Alexander.

Subspecific characters.—Nearest to *C. m. clementis* Mearns, but bill smaller; in adult males, particularly in nuptial plumage, ground color of posterior under parts and sides slightly less buffy and streaks narrower; adult females less Drab, more Drab-Gray above; ground color of under parts decidedly less buffy; streaks Hair Brown, rather than Drab, and narrower.

Of the same size and resembling *Carpodacus m. frontalis* of Colorado, adult males differ in winter plumage in having the upper parts darker, prominently suffused with Victoria Lake; the crown more solidly red, varying from Vandyke Red on the forehead to Victoria Lake on the crown and occiput; red of under parts both in winter and worn nuptial plumage, averaging somewhat more extensive both above and below; ground color of posterior under parts in Winter Plumage more buffy, rather than gray; Pale Pinkish Cinnamon to Pinkish Buff, whiter in worn nuptial plumage, but still with a pinkish suffusion lacking in *frontalis*; in both plumages and sexes more narrowly streaked below.

Differs far more from *solitudinis*, adult males being more extensively red above and below in all plumages; ground color of posterior under parts more pinkish buff in winter plumage, less whitish in nuptial plumage; streaking wider. Females darker above, less whitish ground color below.

Range.—Expresses its characters most markedly in the forty to eighty inch rainfall areas (U. S. Dept. Agri., 1922, Atlas of Amer. Agric., Climate, Precipitation, pp. 6-7) of the Transition Zone of southwestern Oregon and northern California; thence it extends south throughout the Upper Sonoran Zone, except in northeastern California and the Mono Lake region, also into portions of the Lower Sonoran Zone, to the San Pedro Martir Mountains and the northwestern coast of Lower California, as far as latitude

³ It is peculiarly fitting that California's best-known bird should bear the name of the distinguished ornithologist, whose recent passing makes us realize how much Californian ornithology is indebted to him.

28°; also on the Farralone Islands, the northern members of the Santa Barbara group, the Todos Santos and Cedros Islands.

Remarks on Range.—In the southern part of its range, *grinnelli* is represented on the mainland from approximately Santa Cruz south by birds, which on the average have whiter ground color and the back and occiput less suffused with red and this color slightly less extensive on the posterior under parts, particularly in the nuptial plumage. But they are closer to *grinnelli*. Some males have the red less extensive during the first year than during the second and third years (Micheners, 1931, op. cit. p. 17), but these individuals have been carefully considered in statements made throughout this paper. Undoubtedly the presence in southern California of some extensively red winter birds can be explained as migrants from the north, but I have inspected a June 14th male (Dickey Col. No. 26946) from El Monte, and a June 8th male (M. V. Z. Col. No. 11583) from Riverside, which almost precisely match northwestern birds.

In sections of the Lower Sonoran Zone of California, apparently where the mean annual rainfall is approximately not much more than ten inches, such as in the region from Riverside to Santa Ana, *grinnelli* seems to be the resident form, but where it is less than ten inches, such as in the deserts of the southeast, the southern part of the San Joaquin Valley, and even in the restricted ten-inch rainfall areas of southwestern San Diego County, a varying series of intergrades occur, most of them closer to *solitudinis*, showing at least the whiter ground color of the posterior under parts, noticeably in the nuptial plumage.

In the north, the few specimens available from Curry County to Sam's Valley, Jackson County, Oregon, are *grinnelli*, but eastwardly at Klamath Falls, Oregon, and Tule Lake, California, we find intergrades with *solitudinis*. Generally, the birds east of the Cascades are either intergrades or true *solitudinis*; west of the Cascades very few specimens have been taken. One female in the collection of Stanley G. Jewett, secured March 21, 1932, at Forest Grove, Washington County, probably should be classed as *grinnelli*.

The subspecific identity of the breeding House Finches at Victoria, British Columbia (Cowan, Condor, Vol. XXXIX, p. 225), can not be determined by the nestling, kindly loaned by Mr. Cowan. I am listing them tentatively as *grinnelli*. The following quotation from Mr. Cowan's letter indicates this is not a sporadic occurrence, but seems to portend a permanent annexation of new territory: "Last summer I kept close watch and was able to locate six singing males in various parts of this city." Its presence in this Humid Transition Zone would indicate its affinity with *grinnelli*. In view of the above record, it is rather strange that the House Finch has not been taken in western Washington, west of the Cascades (Kitchen, Northwest Fauna Ser., No. 1, Feb., 1934, p. 19). Mr. Kitchin confirms this in a letter of March 3, 1939.

Specimens examined.—1 ♂ 1 ♀ (nestlings) from VANCOUVER IS., B. C.: Victoria. 6 ♂ 3 ♀ from western and southwestern OREGON: Forest Grove, Pistol River, Medford, Sam's Valley, Central Point. 54 ♂ 32 ♀ from CALIFORNIA: near Callahan (includ. Type), N. E. Mt. Shasta, Maytem,

Eureka, above Ruth, near Baird, mouth Battle Creek, Paine's Creek, near Red Bluff, Petaluma, Nicasio, San Geronimo, San Francisco, Ingle-side, near Giant, near Albany, Oakland, Arroyo Mocho, West Berkeley, Mt. View, Palo Alto, Sacramento, Stockton, Grass Valley, Santa Cruz, Pacific Grove, Monterey, Dudley, San Benito Mt., Trout Creek, Tipton, Bodfish, Santa Barbara, Santa Cruz Is., Santa Rosa Is., San Miguel Is., Ventura, Ojai Valley, Alamitos Bay, Pasadena, El Monte, Alhambra, San Pedro, Palms, Los Angeles, Glendora, Long Beach, Covina, Pomona, near Culver City, Ontario, Riverside, Santa Anita River bottom, Lemon Grove, Torrey Pines, Jamul Creek, Dulzura, Jacumba, Campo, Mountain Spring, Battle Creek. 8 ♂ 1 ♀ from northern LOWER CALIFORNIA: Mission St. Maria, Valladares, San Pablo, El Medano, San Telmo, north end Cedros Is.

Remarks.—Although we are still in doubt as to the racial identification of the birds of northeastern Washington, the unbroken continuity of the white-bellied birds from eastern Oregon and Nevada through southeastern California to northeastern Lower California, indicate that the ranges of *grinnelli* and *frontalis* are separated, and that the area between is occupied by *solitudinis*, a bird which is far more different from either than *grinnelli* is from *frontalis*. In spite of the nearer approximation of the characters of *grinnelli* and *frontalis*, it is possible to differentiate them immediately. Three groups must be kept separate, the freshly-molted fall birds from September to approximately November 10th, the winter birds from the latter date to March 1st and the worn nuptial plumage birds from April 1st to June 15th. Ridgway's failure to realize the importance of this segregation accounts for his incorrect conclusion, mentioned previously. Furthermore, it seems clear he did not have available a sufficient, if any series, from the Humid Transition Zone of northwestern California and southwestern Oregon, which are imperatively essential for a decision. He was also unfamiliar with the relatively great extent to which the red is gradually worn away from November to June.

A series of April and May adult males of the two races, laid out side by side, give a convincing demonstration. Of nine adult male *frontalis* from Colorado, which are clearly not darkened by coal dust, all are markedly gray with gray crowns and backs, except one, which has a moderate suffusion of red on the back. Of the twelve *grinnelli* from the northern counties of California, namely Shasta, Humboldt, Trinity and Tehama, all have reddish upper parts, some exceedingly incarnidined, and the crowns and occiputs strongly red, in most cases solidly so. The same is true of six April and May adult males from Alameda and Contra Costa Counties. On the under parts the contrast is still greater. Every one of the eighteen California males, with the exception of one, is much more brilliantly and much more extensively red than all, except one of the Colorado birds. I should emphasize that these are not selected individuals, but the total of adult April and May males available. The same comparison is true, but to a lesser degree, of the birds of winter plumage, when compared month by month.

I take this opportunity to make correction of errors in my previous article in this volume of the Proceedings, which occurred on page 59. The word "not" in the third line from the bottom of the page crept in by some *lapsus* and should have been eliminated in the proof-reading. In the same paragraph in the seventh line from the bottom of the page, quotation marks should appear after the word "species." In the second line from the bottom of the page quotation marks should have been inserted before the words "was made by," and the first word on page 60 should be singular, not plural. On the third line from the top of page 59, quotation marks should appear after the words "taken it."